Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of the claims in the application:

Listing of Claims:

1.   (Cancelled)

2.   (Currently Amended) A method in accordance with claim ~~1~~ 5, further comprising ~~the step of~~ sequentially repeating detecting motion of said target and determining the difference in the position of said target ~~steps C through E~~ during treatment, ~~whereby~~ wherein said plurality of radiosurgical beams remain directed ~~focused~~ onto said target in accordance with said treatment plan throughout the duration of the treatment, and ~~whereby~~ wherein said radiosurgical beam source tracks said movement of said target.

3.   (Cancelled)

4.   (Cancelled)

5.   (Currently Amended) A method of treating a moving target in a patient by applying to said target one or more radiosurgical beams generated from a radiosurgical beam source, the method comprising: ~~in accordance with claim 3,~~

generating a pre-operative 3D scan of said target and of a surrounding region, said 3D scan indicating the position of said target relative to said surrounding region;

based on said 3D scan, generating a treatment plan defining a plurality of radiosurgical beams appropriate for creating at least one radiosurgical lesion on said target;

in near real time, detecting the motion of a target to determine the position of said target at a current time, and generating one or more signals representative of said motion of said target;

in near real time, determining a difference in the position of said target at said current time, as compared to the position of said target as indicated in said CT scan;

in near real time, adjusting the relative position of said radiosurgical beam source and said target in order to accommodate for said difference, and applying x-rays to said target from said adjusted position of said radiosurgical beam source; wherein said motion of said target is a composite motion that is caused by a combination of:

respiration of the patient; and

pumping of the heart of the patient; and

wherein ~~the step of~~ generating one or more signals representative of said motion of said target comprises:

A.———establishing a look-up table of positional data for said composite motion ~~of~~ said data, by imaging said target and said surrounding region while the target undergoes said composite motion;

B.———establishing a look-up table of cardiac motion data for a succession of points along a ~~the~~ heartbeat cycle of said patient, by imaging said target and said surrounding region while the patient is holding his breath;

C.———establishing a look-up table of respiratory motion data for a succession of points along a ~~the~~ respiratory cycle of said patient, by subtracting said cardiac motion data from said positional data for said composite motion of said data;

D.———generating a first signal representative of the respiratory motion of ~~said~~ patient from the data from said look-up table of respiratory motion ~~data obtained in step~~ e, said first signal being characterized by a first frequency ~~F1~~ representative of the respiratory motion of said patient; and

E.———generating a second signal representative of the cardiac motion of said patient from the data from said look-up table of cardiac motion data ~~obtained in step b~~, said second signal being characterized by a second frequency ~~F2~~ representative of the cardiac motion of said patient.

6.   (Currently Amended) A method in accordance with claim ~~4~~ 5, wherein ~~the step of~~ adjusting the relative position of said radiosurgical beam source and said target comprises:

A. ~~—~~splitting said signal representative of said movement of said target into first and second signals;

B. ~~—~~separately processing said first and second signals to remove undesired components from each signal~~, thereby~~wherein processing said first and second signals comprises:

generating a first processed signal substantially characterized by a <u>first</u> frequency ~~F1~~ representative of the respiratory motion of said patient, and a second processed signal substantially characterized by a <u>second</u> frequency ~~F2~~representative of the pumping of the heart of said patient;

C. ~~—~~generating from said first processed signal a first correction factor that is effective, when applied to a controller that controls the position of said radiosurgical beam source with respect to said target, to modify the position of said radiosurgical beam source relative to said target ~~so as~~ to account for the movement of said target due to respiration of said patient;

D. ~~—~~generating from said second processed signal a second correction factor that is effective, when applied to said controller, to modify the position of said radiosurgical beam source relative to said target ~~so as~~ to account for the movement of said target due to the pumping of the heart of said patient;

E. ~~—~~superposing said first and second correction factors~~, thereby generating~~ <u>to generate</u> a combined correction factor that is effective, when applied to said controller, to modify the position of said radiosurgical beam source relative to said target ~~so as~~ to account for said composite motion of said target region caused by both respiration and cardiac pumping.

7. (Original) A method in accordance with claim 6, wherein said first signal and said second signal are substantially decoupled and mutually orthogonal.

8. (Currently Amended) A method in accordance with claim 6, wherein ~~the step of~~ processing said first and second signals comprises ~~the steps of~~ using an adaptive filter to filter out noise.

9.   (Currently Amended) A method in accordance with claim 6, wherein ~~the step of~~ processing said first and second signals comprise ~~the steps of~~ using one or more noise-canceling algorithms for eliminating one or more undesired frequency components.

10.   (Currently Amended) A method in accordance with claim 9, wherein said one or more noise-canceling algorithms are effective to:

    ~~A.~~   extract said one or more undesired frequency components;

    ~~B.~~   invert said extracted frequency components; and

    ~~C.~~   generate one or more signals that cancels said one or more undesired frequency components.

11.   (Original) A method in accordance with claim 6, wherein said respiratory motion is characterized by a respiratory cycle, and wherein said first correction factor is a relatively static factor that accounts for motion of said target during only a selected portion of said respiratory cycle.

12.   (Currently Amended) A method in accordance with claim 11, wherein said selected portion of said respiratory cycle is centered about a peak within said <u>respiratory</u> cycle.

13.   (Currently Amended) A method in accordance with claim 6, wherein ~~the step of~~ generating said first correction factor comprises:

    digitally comparing said one or more near real-time x-ray images with said pre-operative 3D scan ~~so that~~<u>to</u> compute the difference in position between the position of the target <u>as indicated</u> in the <u>pre-operative</u> 3D scan as compared to the position of the target in said <u>near</u> real-time x-ray images ~~can be computed~~.

14.   (Currently Amended) A method in accordance with claim 13, wherein ~~the step of~~ digitally comparing said near real-time x-ray images ~~includes the steps of~~<u>comprises</u>:

A.———generating one or more <u>digitally reconstructed radiographs (DRRs)</u> using the <u>pre-operative</u> 3D scan together with said known beam paths and intensities of said x-ray imaging beams;

B.———computing ~~the~~ changes in position and orientation of said target <u>in the one or more DRRs</u>~~; that are necessary~~ in order to bring said one or more DRRs in registration with said one or more real-time x-ray images.

15.   (Cancelled)

16.   (Currently Amended) A method in accordance with claim ~~1~~ <u>5</u>, wherein said treatment plan ~~contains~~ <u>comprises</u> information regarding ~~the~~ <u>a</u> number, intensities, positions, and directions of said <u>plurality of radiosurgical</u> beams that are effective to create said at least one lesion.

17.   (Currently Amended) A method in accordance with claim ~~3~~ <u>5</u>, further comprising ~~the step of~~ implanting a plurality of fiducials within said surrounding region proximate to said target, before taking said pre-operative 3D scan, ~~so that~~ <u>wherein</u> said position of said target as indicated in said pre-operative 3D scan is the position of the target relative to said plurality of fiducials.

18.   (Cancelled)

19.   (Currently Amended) A method of treating a moving target in a patient by applying one or more radiosurgical beams, generated from a radiosurgical beam source, to said target, the method comprising: ~~in accordance with claim 18,~~

<u>generating a treatment plan containing information defining the positions, angles, and intensities of one or more radiosurgical beams that are adapted to create, when applied to said target, at least one radiosurgical lesion, said treatment plan being based on 3D scan data that indicates the position of said target at treatment planning time;</u>

in near real time, monitoring the motion of said target to determine the difference between the position of the target at a current time, as compared to the position of said target at treatment planning time as indicated by said 3D scan data;

in near real time, adjusting the relative position of the radiosurgical beam source and said target to account for the difference in target position using a robotic controller; and

applying one or more radiosurgical beams from said adjusted position of said radiosurgical beam source; and

wherein said motion of said target is caused by the respiration and the heart beat of said patient; and wherein the ~~step of~~ adjusting said relative position of said radiosurgical beam source to account for the difference in target position comprises:

A. ~~~~ sensing the motion of said target during a ~~relatively short~~ time interval, using a breathing sensor and a heart beat sensor;

B. ~~~~ extrapolating said motion into a complete cycle; and

C. ~~~~ synchronizing said robotic controller with said extrapolated motion of said target.

20.   (Cancelled)

21.   (Cancelled)

22.   (Currently Amended) A system for treating a moving target in a patient by forming a radiosurgical lesion on said target, the system ~~in accordance with claim 21,~~ ~~further~~ comprising:

an apparatus for generating 3D scan data representative of a pre-operative 3D diagnostic image of said target and a surrounding region;

a processor including treatment planning software for generating, based on said 3D scan data, a base treatment plan defining a plurality of x-ray beams appropriate for creating at least one lesion in said target;

a beam source for generating one or more radiosurgical beams adapted to create at least one lesion in said target;

a positioning system that controls the relative position of said beam source and said target;

imaging means for generating at least one real-time x-ray image of said target;

means for sensing the motion of said target, and for generating at least one signal representative of said motion; and

means for generating from said at least one signal at least one correction factor that is effective, when applied to said positioning system, to modify the position of said beam source relative to said target so as to accommodate for the difference in position of said target at a current time as compared to the position of said target in said pre-operative diagnostic image;

a signal processor coupled to the processor, the signal processor to process for processing said at least one signal to generate a first signal substantially characterized by a first frequency F1, and a second signal substantially characterized by a second frequency F2;

B.———means for generating from said first signal a first correction factor, and for generating from said second signal a second correction factor; and

C.———means for superposing said first correction factor and said second correction factor to obtain said correction factor that is effective, when applied to said positioning system, to modify the position of said beam source relative to said target so as to accommodate for the difference in position of said target at a current time as compared to the position of said target in said pre-operative diagnostic image.

23.   (Currently Amended) A system in accordance with claim 21 22, wherein said motion of said target is caused by respiration of said patient and by the pumping of the heart of said patient, and wherein said means for sensing the motion of said target includes a breathing sensor for sensing the respiration of said patient, and a heart rate monitor for monitoring the cardiac pumping of said patient.

24.   (Currently Amended) A system in accordance with claim 22, wherein said first frequency F1 is representative of the respiratory motion of said patient, and said second frequency F2 is representative of the cardiac pumping motion of said patient.

25.   (Currently Amended) A system in accordance with claim 22, wherein said signal processor comprises:

A.——means for splitting said at least one signal into first and second signals;

B.——means for processing said first and second signals to remove undesired components from each signal, so as to generate said first signal substantially characterized by a first frequency F1, and said second signal substantially characterized by a second frequency F2.

26.   (Original) A system in accordance with claim 25, wherein said means for processing said first and second signals comprises an adaptive filter for filtering out noise.

27.   (Currently Amended) A system in accordance with claim 25, wherein said means for processing said first and second signals comprises software that includes one or more noise-canceling algorithms for eliminating one or more undesired frequency components, and wherein said one or more noise-canceling algorithms are effective to:

A.——extract said undesired frequency components;

B.——invert said extracted frequency components; and

C.——generate one or more signals that cancel said undesired frequency components.

28.   (Original) A system in accordance with claim 22, wherein said first correction factor is a relatively static factor that accounts for motion of said target during only a portion of said respiratory cycle.

29.   (Currently Amended) A system in accordance with claim 22, wherein said means for generating said first correction factor comprises means for digitally comparing said one or more near real-time x-ray images with said pre-operative 3D scan so that to calculate the difference in position between the position of the target as indicated in the pre-operative 3D scan as compared to the position of the target in said near real-time x-ray images can be computed.

30.   (Currently Amended) A system in accordance with claim ~~21~~ 22, wherein said positioning system is an industrial robot having an articulated arm assembly, and wherein said radiosurgical beam source is an x-ray linac mounted at one end of said articulated arm assembly of said robot.

31.   (Currently Amended) A system in accordance with claim ~~21~~ 22, wherein said positioning system is effective, in response to receipt of said correction factor, to modify the position of said beam source in such a way that said radiosurgical beam source tracks the motion of said target.

32.   (Currently Amended) A system in accordance with claim ~~21~~ 22, wherein said imaging means comprises:

    A. ~~one~~ one or more x-ray sources ~~for generating~~ to generate x-ray imaging beams; and

    B. ~~one~~ one or more corresponding x-ray detectors ~~for detecting~~ to detect said imaging beams after said imaging beams have traversed said target.

33.   (Currently Amended) A system in accordance with claim 29, wherein said means for digitally comparing said one or more near real-time x-ray images with said 3D scan comprises:

    A. ~~means~~ means for generating one or more DRRs using the 3D scan together with information regarding the beam paths and intensities of said x-ray imaging beams; and

    B. ~~computing~~ computing the changes in position and orientation of said target that are necessary in order to bring said one or more DRRs in registration with said one or more real-time x-ray images.

34.   (Currently Amended) A system in accordance with claim ~~21~~ 22, wherein said pre-operative 3D scan data comprise at least one of~~:~~ CT scan data; PET scan data; ~~and~~ or MRI scan data.

35.   (Cancelled)

36.   (Cancelled)

37.   (New) A method, comprising:

determining a pulsating motion of a patient separately from a determining of a respiratory motion; and

directing a radiosurgical beam, from a radiosurgical beam source, to a target in the patient based on the determining of the pulsating motion.

38.   (New) The method of claim 37, wherein the target is a heart and the pulsation motion is due to a heartbeat of the heart, and wherein directing the radiosurgical beam to the target comprises creating a lesion in the heart to inhibit atrial fibrillation.

39.   (New) The method of claim 37, further comprising:

determining the respiratory motion of the patient; and

compensating for movement of the target, due to the respiratory motion and the pulsating motion of the patient, in the directing of the radiosurgical beam based on the determining of the respiratory motion and the determining of the pulsating motion.

40.   (New) The method of claim 39, wherein determining the respiratory motion comprises detecting a respiratory cycle and determining the pulsating motion comprises detecting a pulsating cycle, and wherein the pulsating cycle is detected separately from the detecting of the respiratory cycle.

41.   (New) The method of claim 40, wherein determining the respiratory motion comprises:

detecting a first motion of a target in a patient caused by a combined respiratory and pulsating motion of the patient during a first respiratory cycle;

detecting a second motion of the target in the patient caused substantially only by a pulsating motion while the patient holds a breath during a second respiratory cycle; and

calculating the respiratory motion of the target in the patient using the detected first and second motions.

42.   (New) The method of claim 41, wherein detecting the first motion of the target in the patient caused by the combined respiratory and pulsating motion during the first respiratory cycle comprises:

generating one or more radiographic images of the target during the first respiratory cycle; and

combining information of the pulsating cycle and the respiratory cycle with one or more radiographic images of the target during the first respiratory cycle to form the first motion.

43.   (New) The method of claim 42, wherein detecting the second motion of the target in the patient caused substantially only by the pulsating motion during the second respiratory cycle comprises:

generating one or more radiographic images of the target while the patient holds the breath during the second respiratory cycle; and

combining information of the pulsating cycle with one or more radiographic images of the target during the second respiratory cycle to form the second motion.

44.   (New) The method of claim 43, further comprising:

computing a first correction factor from the respiratory motion; and

separately computing a second correction factor from the second motion.

45.   (New) The method of claim 44, further comprising generating a command signal to adjust a relative position of the radiosurgical beam and the target in compensating for the first motion, and wherein compensating for the first motion of the target comprises generating a correction to the command signal using the first and second correction factors.

46.   (New) The method of claim 45, wherein the directing of the radiosurgical beam, from the radiosurgical beam source, to the target in the patient comprises directing the radiosurgical beam using the using the command signal.

47.   (New) The method of claim 45, wherein the first correction factor, when applied to the command signal, is effective to adjust the relative position of the radiosurgical beam source and the target to account for the respiratory motion caused substantially only by the respiratory motion, and wherein the second factor, when applied to the command signal, is effective to adjust the relative position of the radiosurgical beam source and the target to account for the second motion caused substantially only by the pulsating motion.

48.   (New) The method of claim 45, wherein generating one or more radiographic images of the target during the first respiratory cycle comprises:

  generating a first operational scan of the target and an internal marker at a first position;

  generating a second operational scan of the target and the internal marker at a second position;

  generating a first model of internal motion of the internal marker using the first and second positions;

  generating a second model of external motion using the detected second motion and the calculated respiratory motion; and

  correlating the external motion and the internal motion using the first and second models.

49.   (New) The method of claim 48, wherein generating the first model of the internal motion comprises fitting a first curve to the first and second positions of the internal marker, wherein generating the second model of external motion comprises measuring external motion using external markers to generate a plurality of positions of the external markers and fitting a second curve to the plurality of positions of the external markers, and wherein correlating the external and internal motions comprises comparing the first and second curves.

50. (New) The method of claim 45, wherein generating the command signal to adjust the relative position of the radiosurgical beam source and the target comprises adjusting the relative position of a radiosurgical beam source and the target using a robotic positioning system.

51. (New) The method of claim 44, further comprising:

generating a command signal to adjust a relative position of the radiosurgical beam and the target in compensating for the first motion; and

generating a combined correction factor using the first and second correction factors, and wherein compensating for the first motion of the target comprises generating a correction to the command signal using the combined correction factor.

52. (New) The method of claim 44, wherein computing the first and second correction factors comprises:

generating a first signal representative of the respiratory motion;

generating a second signal representative of the second motion;

filtering the first and second signals to cancel out undesired frequency components;

computing the first correction factor from the filtered first signal; and

separately computing the second correction factor from the filtered second signal.

53. (New) The method of claim 41, wherein the pulsating motion is cardiac pumping motion, and wherein calculating the respiratory motion of the target comprises:

establishing a look-up table of positional data for the first motion;

establishing a look-up table of cardiac motion data for the second motion; and

establishing a look-up table of respiratory motion data for the calculated respiratory motion by subtracting the cardiac motion data from the positional data for the first motion.

54. (New) The method of claim 53, further comprising:

generating a first signal representative of the respiratory motion of the patient from the look-up table of respiratory motion data;

generating a second signal representative of the second motion of the patient from the look-up table of cardiac motion data;

computing a first correction factor from the first signal;

separately computing a second correction factor from the second signal; and

generating a command signal to adjust a relative position of the radiosurgical beam and the target in compensating for the first motion, and wherein compensating for the first motion of the target comprises generating a correction to the command signal using the first and second correction factors.

55. (New) The method of claim 44, wherein computing the first and second correction factors comprises digitally comparing the one or more radiographic images with a pre-operative scan.

56. (New) The method of claim 55, wherein digitally comparing the one or more radiographic images with the pre-operative scan comprises:

generating one or more digitally reconstructed radiographs (DRRs), using the pre-operative scan together with the one or more radiographic images; and

computing an amount of movement of the target needed to register the one or more DRRs with the one or more radiographic images.

57. (New) The method of claim 45, wherein generating the correction to the command signal comprises:

extrapolating the detected first motion of the target into a complete cycle; and

synchronizing the command signal to adjust the relative position of the radiosurgical beam source and the target with the extrapolated motion of the target.

58. (New) The method of claim 43, further comprising:

computing a first correction factor from the second motion; and

providing a static correction factor representative of peaks of the respiratory cycle of the calculated respiratory motion caused substantially only by the respiratory motion of the patient.

59.   (New) The method of claim 58, further comprising generating a command signal to adjust a relative position of the radiosurgical beam and the target in compensating for the first motion, and wherein compensating for the first motion of the target comprises generating a correction to the command signal using the first correction factor and the static correction factor.

60.   (New) A system, comprising:

a pulsation measurement device to detect a pulsating cycle of a patient;

a radiosurgical beam source to direct a radiosurgical beam, from the radiosurgical beam source, to a target in a patient; and

a controller coupled to the radiosurgical beam source, wherein the controller is coupled to receive a signal from the pulsation measurement device representative of the pulsating cycle and to determine a pulsating motion of the patient based on the pulsating motion, and wherein the controller is configured to position the radiosurgical beam source to direct the radiosurgical beam using the pulsating motion.

61.   (New) The system of claim 60, further comprising a breathing sensor coupled to the controller, wherein the breathing sensor is configured to detect a respiratory cycle of the patient, and wherein the controller is coupled to receive a signal from the breathing sensor representative of the respiratory cycle and to determine a respiratory motion of the patient based on the respiratory cycle, and wherein the controller is configured to position the radiosurgical beam source to direct the radiosurgical beam using the pulsating motion and the respiratory motion.

62.   (New) The system of claim 61, wherein the target is a heart and the pulsation motion is due to a heartbeat of the heart, and wherein the controller is configured to

position the radiosurgical beam source to direct the radiosurgical beam to the heart to create a lesion in the heart to inhibit atrial fibrillation.

63.   (New) The system of claim 61, wherein the controller is configured to detect a first motion of the target caused by a combined respiratory and pulsating motion during a first respiratory cycle, and a second motion of the target caused substantially only by a pulsating motion during a second respiratory cycle, and wherein the controller is configured to calculate the respiratory motion of the target using the first and second motions, and wherein the controller is configured to position the radiosurgical beam source to compensate for the first motion of the target caused by the combined respiratory and pulsating motion using the second motion and the calculated respiratory motion.

64.   (New) The system of claim 61, further comprising a breathing sensor coupled to the controller, wherein the breathing sensor is configured to detect a respiratory cycle of the patient.

65.   (New) The system of claim 61, further comprising a robotic positioning system coupled to the controller and the radiosurgical beam source, wherein the controller is further configured to compute a first correction factor from the calculated respiratory motion, and separately compute a second correction factor from the second motion, wherein the controller is configured to generate a command signal to adjust a relative position of the radiosurgical beam and the target to compensate for the first motion using the robotic positioning system, wherein the controller is configured to generate a correction to the command signal using the first and second correction factors, and wherein the robotic positioning system is configured to receive the command signal from the controller to adjust the relative position of the radiosurgical beam source and the target.

66.   (New) The system of claim 65, wherein the robotic positioning system comprises six degrees of freedom to adjust the relative position of the radiosurgical beam source and the target.

67.   (New) The system of claim 64, further comprising:

an imaging system coupled to the controller, wherein the imaging system is configured to generate a plurality of images of the target during the first respiratory cycle, and to generate a plurality of images of the target during the second respiratory cycle, and

wherein the controller is configured to record information of the respiratory cycle detected by the breathing sensor and information of the pulsating cycle detected by the pulsation measurement device, during the first respiratory cycle, to receive the plurality of images of the target of the first respiratory cycle, and to combine the recorded information of the respiratory cycle and of the pulsating cycle during the first respiratory cycle with the plurality of images of the target of the first respiratory cycle to generate the first motion, and

wherein the controller is configured to record information of the pulsating cycle detected by the pulsation measurement device during the second respiratory cycle, to receive the plurality of images of the target of the second respiratory cycle, and to combine the recorded information of the pulsating cycle during the second respiratory cycle with the plurality of images of the target of the second respiratory cycle to generate the second motion.

68.   (New) The system of claim 67, further comprising a signal processor coupled to the controller, the signal processor to receive the detected respiratory cycle, the detected pulsating cycle, the plurality of images of the target during the first respiratory cycle, and the plurality of images during the second respiratory cycle,

wherein the signal processor is configured to combine information of the pulsating cycle and the respiratory cycle during the first respiratory cycle with the plurality of images of the target during the first respiratory cycle to form the first motion,

wherein the signal processor is configured to combine information of the pulsating cycle during the second respiratory cycle with the plurality of images of the target during the second respiratory cycle to form the second motion,

wherein the signal processor is configured to calculate the respiratory motion of the target using the first and second motions, and

wherein the signal processor is configured to filter the second motion and the respiratory motion to cancel out undesired frequency components.

69.   (New) The system of claim 68, wherein the controller further comprises a storage unit to store image data of the plurality of images of the target.

70.   (New) The system of claim 68, further comprising:

a pre-operative scanner coupled to the signal processor, the pre-operative scanner to generate a pre-operative scan for one or more of the plurality of images of the target, and

wherein the imaging system is configured to generate one or more operative scans for one or more of the plurality of images of the target, and wherein the controller is configured to digitally compare one or more operative scans with the pre-operative scan.

71.   (New) The system of claim 61, wherein the pulsation measurement device is configured to detect at least one of pulsating arteries or cardiac pumping motion of the patient.

72.   (New) The system of claim 61, wherein the breathing sensor is at least one of an infrared tracking system, a force sensor, an air flow meter, a strain gauge, or a laser range sensor.

73.   (New) The system of claim 61, wherein the pulsating measurement device is at least one of a strain gauge, electrocardiograph, or a heart beat monitor.

74.   (New) The system of claim 61, wherein the pulsating cycle is a heartbeat cycle, wherein the pulsation motion is due to cardiac pumping motion, and wherein the controller comprises:

a look-up table of positional data for the first motion;

a look-up table of cardiac motion data for the second motion; and

a look-up table of respiratory motion data for the calculated respiratory motion, and wherein the controller is configured to calculate the respiratory motion data by subtracting the cardiac motion data from the positional data for the first motion.

75. (New) An apparatus, comprising:

a radiosurgical beam source to direct a radiosurgical beam, from the radiosurgical beam source, to a target in a patient;

means for determining a pulsating motion of a patient separately from a determining of a respiratory motion; and

means for directing a radiosurgical beam, from a radiosurgical beam source, to a target in the patient based on the determining of the pulsating motion.

76. (New) The apparatus of claim 75, further comprising means for positioning the radiosurgical beam source to compensate for respiratory motion and the pulsating motion.

77. (New) The apparatus of claim 75, further comprising:

means for detecting a respiratory cycle of the patient;

means for detecting a pulsating cycle of the patient;

means for generating one or more radiographic images of the target during the first respiratory cycle;

means for generating one or more radiographic images of the target while the patient holds the breath during the second respiratory cycle; and

means for applying radiosurgical beams to the target using the compensated first motion of the target.

78. (New) The apparatus of claim 76, further comprising means for creating at least one radiosurgical lesion on the target to treat atrial fibrillation.